

CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended) A gas delivery metering tube for delivering a gas, ~~comprising~~ consisting of:

an innermost elongated tube, said innermost tube having ~~two ends~~, a one gas delivery end that is attached to a gas supply, and an opposite, capped end, one or more arrays of orifices being formed in said innermost tube and extending along a substantial length of said innermost tube; and

an outermost elongated tube, said outermost tube having one or more arrays of orifices extending along a substantial length of said outermost tube, said outermost tube being disposed such that it is nested and axially aligned with said innermost tube and such that an effective annular space is formed between said innermost and outermost nested tubes;

wherein gas flowing into the innermost tube from the gas supply is introduced into an interior of the innermost tube at the one gas delivery end, and wherein the innermost tube has the following properties:

$$L/D < 70$$

$$D/d \approx > 10$$

$$NA_{port}/A_{tube} \approx <1$$

where L is the length and D is the diameter of the innermost tube, d is the diameter of one orifice in said array of orifices in said innermost tube, N is the number of orifices in the innermost tube, A_{port} is the cross sectional area of each of said orifices, and A_{tube} is the cross sectional area of the interior of said innermost tube; and

the outermost tube has the following properties:

$$D_{eff} \text{ and } D_{in} \text{ are within a factor of three of each other}$$

$$SurfaceArea_{outer}/NA_{outer} \approx 10 \text{ or more}$$

where D_{eff} is an effective diameter of the effective annular space, $SurfaceArea_{outer}$ is the surface area of the outermost tube, NA_{outer} is the total cross sectional area of all of the orifices in

the outermost tube, and D_{in} is the inner diameter of the innermost tube, such that delivery of the gas out of the orifices in the outermost tube is substantially uniform along the substantial length of the outermost tube over a range of operating conditions.

Claim 2 (Cancelled)

Claim 3 (Original) The gas delivery metering tube of Claim 2 wherein D_{eff} is approximately equal to D_{in} .

Claim 4 (Cancelled)

Claim 5 (previously presented) The gas delivery metering tube of Claim 1 wherein $\text{SurfaceArea}_{\text{outer}}/\text{NA}_{\text{outer}} > 100$.

Claim 6 (Original) The gas delivery metering tube of Claim 1 wherein said metering tube is used in a chemical vapor deposition system.

Claim 7 (Cancelled)

Claim 8 (Cancelled)

Claim 9 (Original) The gas delivery metering tube of Claim 1 wherein the nested tubes are cylindrical.

Claim 10 (Original) The gas delivery metering tube of Claim 1 wherein the nested tubes are rectangular.

Claim 11 (Original) In combination, the gas delivery metering tube of Claim 1 and at least one injector assembly having at least one port for receiving said gas delivery metering tube.

Claim 12 (Original) In combination, the gas delivery metering tube of Claim 1 and at least one shield assembly having at least one plenum for receiving said gas delivery metering tube.

Claims 13 to 16 (Cancelled)

Claim 17 (currently amended) A gas delivery metering tube, ~~comprising~~ consisting of: an inner tube having ~~an~~ one open end, a capped end opposite the open end, and a first array of orifices distributed along a substantial length of the inner tube between the open end and the capped end, the inner tube being configured to allow introduction of a gas into its entire inner

volume from the one open end and to provide an outflow of the gas through the first array of orifices wherein the first array of orifices are sized and numbered to establish a substantially uniform backing pressure within the entire inner volume of the inner tube despite the introduction of the gas from only the one open end; and

an outer tube nested and axially aligned with the inner tube so that an annular space is formed between the inner and outer tubes to receive the outflow of the gas from the inner tube, the outer tube including a second array of orifices distributed along a substantial length of the outer tube, the second annular space being sized and the second array of orifices being sized and numbered to achieve substantially uniform gas pressure in the annular space and an outflow of the gas through the second array of orifices that is substantially uniform along the substantial length of the outer tube for a range of operating conditions.

Claim 18 (cancelled)

Claim 19 (previously presented) The gas delivery metering tube of Claim 17 wherein a cross sectional area of the annular space is within a factor of three of a inner cross sectional area of the inner tube, and wherein a total cross sectional area of the second array of orifices in the outer tube is equal to or less than one tenth of a surface area of the outer tube to promote pressure uniformity within the annular space and uniform outflow of the gas along the substantial length of the outer tube.

Claim 20 (previously presented) The gas delivery metering tube of Claim 19 wherein the cross sectional area of the annular space and the cross sectional area of the inner tube are approximately equivalent.

Claim 21 (previously presented) The gas delivery metering tube of Claim 19 wherein the total cross sectional area of the plurality of orifices in the outer tube is equal to or less than one hundredth of the surface area of the outer tube.

Claim 22 (previously presented) The gas delivery metering tube of Claim 17 wherein the first array of orifices and the second array of orifices are rotationally offset by about 180 degrees from each other.

Claim 23 (previously presented) The gas delivery metering tube of Claim 17 wherein the inner tube and the outer tube are made of a material that tolerates cleaning etchants including hydrofluoric acid.

Claim 24 (previously presented) The gas delivery metering tube of Claim 17 wherein the substantial length of the inner tube is about 68 times a diameter of the inner tube.

Claim 25 (previously presented) The gas delivery metering tube of Claim 17 wherein an inner diameter of the inner tube is about 0.114 inch and an outer diameter of the inner tube is about 0.134 inch.

Claim 26 (previously presented) The gas delivery metering tube of Claim 17 wherein an inner diameter of the inner tube is about 0.136 inch and an outer diameter of the inner tube is about 0.156 inch.

Claim 27 (previously presented) The gas delivery metering tube of Claim 17 wherein the sizes of the plurality of orifices in the inner tube are smaller than the sizes of the plurality of orifices in the outer tube.

Claim 28 (previously presented) The gas delivery metering tube of Claim 27 wherein a diameter of each of the plurality of orifices in the inner tube is about 0.0095 inch to about 0.014 inch, and a diameter of each of the plurality of orifices in the outer tube is about 0.0138 inch to about 0.0153 inch.